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09/839803
IM1303USNA
APPEAL BRIEF UNDER 37 CFR 41.37

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In the Application of:

ADRIAN LUNGU

CASE NO.: IM1303 US NA

APPLICATION NO.: 09/839,803

GROUP ART UNIT: 1752

FILED: APRIL 20, 2001

EXAMINER: WALKE, AMANDA C

CONFIRMATION NO.: 2560

FOR: A PHOTOPOLYMERIZABLE ELEMENT FOR USE AS A FLEXOGRAPHIC PRINTING PLATE

APPEAL BRIEF UNDER 37 CFR 41.37

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with 37 CFR 41.37, the following is a brief in support of the Appeal filed July 5, 2006, appealing the Final Rejection dated April 18, 2006 of Claims 1, 3 through 19, 31 through 33 and 40.

Please charge the Appeal Brief fee of $500.00 pursuant to 37 CFR 41.20(b)(2), to Deposit Account No. 04-1928 (E. I. du Pont de Nemours and Company). The Commissioner is hereby authorized to charge any additional fees which may be required or credit any overpayment to Deposit Account No. 04-1928.

REAL PARTY IN INTEREST

The real party in interest is E. I. du Pont de Nemours and Company (the "Assignee"), 1007 Market Street, Wilmington, Delaware 19898, to whom this application has been assigned, said assignment being recorded at Reel 012150, Frame 0785.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to the Appellant, the Appellant's legal representative, or the Assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 1, 3 through 19, 31 through 33 and 40, as set forth in the Claims Appendix, are pending, rejected and under appeal. Claims 2, 20 through 30, and 34 through 39 have been cancelled.

STATUS OF AMENDMENTS

All amendments filed subsequent to the Final Rejection have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

As described in the specification on pages 3 and 4 and recited in Claims 1 and 33, the present invention is a photopolymerizable element for use as a flexographic printing plate comprising a support and a photopolymerizable elastomeric layer on the support. The photopolymerizable layer comprises a binder, at least one monomer, a photoinitiator, an onium salt and a leuco dye. Claim 1 defines a photopolymerizable element wherein the onium salt is present in greater reactive amount than the leuco dye and is selected from the group consisting of phosphonium salts, selenonium salts, triarylselenonium salts, iodonium salts, diaryliodonium salts, sulfonium salts, triarylsulphonium salts, dialkylphenacylsulphonium salts, triarylsulphoxonium salts, aryloxydiarylsulphoxonium salts, dialkylphenacylsulphoxonium salts, and combinations thereof. In use, the photopolyermizable layer is imagewise exposed to actinic radiation forming polymerized and unpolymerized portions in the layer, and also backflash exposed through the support to actinic radiation to form a floor. The imagewise exposed layer is then treated to remove the unpolymerized portions and form a relief surface having raised areas that contrast in color with the floor.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 3 through 19, 31 through 33 and 40 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Araki et al. (JP 59-211036) in view of Applicant's admission.

ARGUMENT

Araki et al. disclose a photopolymerizable image-forming composition containing a binder of a polymeric material, photopolymerizable monomer or oligomer, photopolymerization initiator, reducing dye, and a VIb group onium salt-type photoactivator having an optical absorption wavelength range different from the photopolymerization initiator. Although Araki et al. suggest use of their photopolymerizable image-forming composition for relief printing plates, no examples are provided showing use in a relief printing plate, and the disclosure of Araki et al. is primarily directed to its application as a photoresist. Araki et al. disclose that the composition may contain 0.01 to 10 parts by weight of the reducing dye agent and 0.001 to 2 parts by weight of the VIb group onium salt

photoactivator. In Example 1, a photopolymerizable composition containing a binder (polymethyl methacrylate), monomer, photoinitiators, a leuco dye, and an onium salt is coated to form a 2 mil (50 micron) layer on a support, which is then laminated to a copper side of an epoxy resin plate. The laminated plate was exposed to 90 millijoules of ultraviolet radiation from a high pressure mercury lamp for 20 seconds, resulting in unexposed parts of the layer being colorless, and exposed parts of the layer being clearly colored purple.

Claim 1 specifically recites that the onium salt is present in greater reactive amount than the leuco dye. To prepare a flexographic printing plate from the photopolymerizable element, the element is exposed to actinic radiation for each of the main imagewise exposure, backflash exposure, and post-exposure. *The onium salt is present in greater reactive amount than the leuco dye* so that the leuco dye is completely reacted or substantially completely reacted with the onium salt during the main imagewise exposure of the element. After the main exposure, no or substantially no leuco dye is available to react with the excess onium salt. Thus, any further change in color contrast should not occur when the element is post-exposed. (The backflash exposure is typically much shorter than the main exposure, and thus sufficient exposure energy is not reached to induce the color change.) As shown in the Example starting on page 25 of the present specification, a photopolymerizable element having the leuco dye in greater amount than the onium salt, created color contrast after main exposure, but lost its color contrast after final post exposure/finishing. In order for the photopolymerizable element to retain color contrast in the resulting printing element, the onium salt must be in greater reactive amount than the leuco dye.

Araki et al. alone or in combination with the present background disclosure do not show or suggest that the onium salt is present in greater reactive amount than the leuco dye, as recited in Claim 1. Araki et al. disclose a proportion of each of the components in the composition, but the ranges disclosed appear to have the reducing agent (dye) in greater amounts than the onium salt photoactivator (see translation page 5, last paragraph). Araki et al. disclose that the photopolymerizable composition contains the reducing agent, i.e., dye, at 0.01~10 parts by weight and the onium salt photoactivator at 0.001~2 parts by weight (based on 100 parts by weight of a binder), which suggests by way of comparison that the reducing agent (dye) overall is in greater amount than the onium salt photoactivator. This interpretation is substantiated in Example 1 of Araki et al. where the photoresist composition contains the dye reducing agent at 1.0 g and the onium salt at 0.1 g, that is, the amount of the dye is 10 times the amount of the onium salt. Araki et al. do not address how to retain the color contrast in a photopolymerizable element that undergoes multiple exposures. Thus, Araki et al. do not show or suggest a printing plate made from a photopolymerizable element wherein the photopolymerized layer has a relief surface with raised areas and a floor that contrasts in color with the raised areas, as recited in Claim 33. Araki et al. do not suggest color contrast

between raised areas of a relief surface and the floor in the photopolymerized layer of a flexographic relief printing plate.

For the present invention, the criticality of the onium salt being in greater reactive amount than the leuco dye is demonstrated in the Examples. Example 1 forms a photopolymerizable printing element having a photopolymerizable layer of about 60 mils where the iodonium salt at 0.5% by weight is in greater reactive amount than the leuco Crystal Violet lactone dye at 0.25%. The photopolymerizable printing element was backflash exposed for 45 seconds to ultraviolet (UV) radiation and no color change was observed. The photopolymerizable printing element was then imagewise main exposed to UV radiation causing exposed areas to change color, and thus color contrast was observed between the exposed areas (polymerized portions became a dark blue color) and the unexposed areas (unpolymerized portions remained pink-red color). The photopolymerizable printing element was developed, dried, and post-exposed and the element *retained a color contrast between the polymerized raised image areas,* which were dark blue, *and the polymerized floor* which remained pink-red. In comparison as shown in the Example starting on page 25, a photopolymerizable element having the leuco dye in greater reactive amount than the onium salt will not retain the color contrast through the final process steps of forming a printing form. In this Example, a photopolymerizable element having a photopolymerizable layer of about 60 mils contains the Crystal Violet lactone dye at 0.5% by weight and the onium salt at 0.25%. This photopolymerizable printing element was exposed as described in Example 1, creating a color contrast between exposed and unexposed areas after main exposure, but lost its color contrast between the polymerized raised areas of the relief and the polymerized floor after final post exposure/finishing. Clearly, the present invention demonstrates that in order for the photopolymerizable printing element to retain color contrast in the final printing element, the onium salt must be in greater reactive amount than the leuco dye. Araki et al. do not teach or suggest how to retain color contrast throughout the process of multiple exposures to form a photopolymerizable *printing* form where *exposed areas forming the relief surface change color* and ***exposed areas forming the floor of the printing form do not change color,*** thereby providing color contrast between the polymerized raised areas of the relief surface and the polymerized floor of the flexographic printing plate. An advantage of retaining the color contrast in the final flexographic printing form is that the color contrast facilitates mounting of the printing form in registration on a printing cylinder of a press.

The Examiner has indicated that one of ordinary skill in the art would have been reasonably motivated to employ the compounds in any amounts within their claimed ranges, and obtain a material wherein the onium salt compound is employed in greater amount than the dye. However, obviousness can not be established unless there is some teaching, suggestion or incentive from within a reference or a combination of references that would lead one of ordinary skill in the art to arrive at the claimed invention. The fact that Araki et al.

merely disclose that the combination of a leuco dye and VIb group onium salt-type activator as an optical color coupler can be used in the photopolymerizable layer of a relief printing plate is not a sufficient suggestion or teaching that would lead one of ordinary skill in the art to specifically employ the onium salt in greater reactive amount than the leuco dye. Especially since Araki et al. do not teach or suggest color contrast between raised areas of a relief surface and the floor in the photopolymerized layer of a flexographic relief printing plate, to employ the onium salt in greater reactive amount than the leuco dye would constitute hindsight in view of the present invention. Araki et al. teach creating color contrast between exposed areas and unexposed areas in a layer of a photopolymerizable composition. Color contrast is also created between exposed areas and unexposed areas in a layer of a photopolymerizable elastomeric composition for the present photopolymerizable printing element. However, Araki et al. do not teach or suggest how to retain color contrast throughout the process of multiple exposures to form a photopolymerizable *printing* form where ***exposed areas forming the relief surface change color*** and ***exposed areas forming the floor of the printing form do not change color***, and thereby provide color contrast between the polymerized raised areas of the relief surface and the polymerized floor of the flexographic printing plate. Thus, Applicant respectfully submits that the present photopolymerizable element comprising the photopolymerizable elastomeric layer as recited in Claim 1, wherein the VIb group onium salt is present in greater reactive amount than the leuco dye, is patentable over Araki et al. in view of Applicant's admission.

For the reasons stated above, the combination of Araki et al. with Applicant's admission does not render obvious a printing plate made from a photopolymerizable element wherein the photopolymerized layer has a relief surface with raised areas and a floor that contrasts in color with the raised areas, as recited in Claim 33. Araki et al. do not teach or suggest color contrast between raised areas of a relief surface and the floor in the photopolymerized layer of a flexographic relief printing plate.

Claims 3 through 19, 31, 32 and 40 are dependent from Claim 1. Therefore, Claims 3 through 19, 31, 32 and 40 incorporate the patentable novelty of Claim 1, and the allowance of such claims over the cited references appears to be in order for at least the reasons given with respect to Claim 1.

Accordingly, the Board of Patent Appeals and Interferences is respectfully requested to find that the Examiner erred in the rejection of Claims 1, 3 through 19, 31 through 33 and

40 in this application and that such claims are therefore allowable.

Respectfully submitted,

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CLAIMS APPENDIX

1. A photopolymerizable element for use as a flexographic printing plate comprising:
   (a) a support;
   (b) a photopolymerizable elastomeric layer on the support, comprising a binder, at least one monomer, a photoinitiator, an onium salt and a leuco dye, wherein the onium salt is present in greater reactive amount than the leuco dye and is selected from the group consisting of phosphonium salts, selenonium salts, triarylselenonium salts, iodonium salts, diaryliodonium salts, sulfonium salts, triarylsulphonium salts, dialkylphenacylsulphonium salts, triarylsulphoxonium salts, aryloxydiarylsulphoxonium salts, dialkylphenacylsulphoxonium salts, and combinations thereof.

3. The photopolymerizable element of Claim 1 wherein the onium salt is selected from the group consisting of sulfonium salts, phosphonium salts, and iodonium salts.

4. The photopolymerizable element of Claim 1 wherein the leuco dye is a cyclic lactone dye.

5. The photopolymerizable element of Claim 4 wherein the cyclic lactone dye is selected from the group consisting of aminotriarylmethane compounds, amino-2,3-dihydroanthraquinones, and tetrahyhalo-p,p'-bihenols.

6. The photopolymerizable element of Claim 4 wherein the cyclic lactone dye is selected from the group consisting of

6'-(diethylamino)-3'-methyl-2'-(phenylamino) spiro(isobenzofuran-1(3H),9'-(9H)xanthen)-3-one;
2'-di(phenylmethyl) amino-6'-(diethylamino)spiro(isobenzofuran-1(3H),9'-(9H)xanthen)-3-one;
6-(dimethylamino)-3,3-bis(4-dimethylamino)phenyl-1(3H)-isobenzofuranone;
6-(dimethylamino)-3,3-bis[4-(dimethylamino)phenyl]-1(3H)-isobenzofuranone;
2'-[bis(phenylmethyl)amino]-6'-diethylaminospirobenzofuran-1(3H),9'-[9H]xanthen]-3-one;
3-[bis(4-octylphenyl)amino]-3-[4-dimethylamino)phenyl]-3(3H)-izobenzofuranone; and
3,3-bis(1-butyl-2-methyl-1H-indol-3-yl)-1(3H)-izobenzofuranone.

7. The photopolymerizable element of Claim 1 wherein the onium salt is sensitive to the same wavelength of radiation as the photoinitiator.

8. The photopolymerizable element of Claim 1 wherein the onium salt is sensitive to radiation between 310 and 400 nm.

9. The photopolymerizable element of Claim 7 wherein the onium salt absorbs radiation between 345 and 365 nm.

10. The photopolymerizable element of Claim 1 wherein the amount of the onium salt is 0.2 to 0.6% by weight, based on the total weight of the components in the photopolymerizable layer.

11. The photopolymerizable element of Claim 1 wherein the onium salt is present in greater reactive amount than the leuco dye.

12. The photopolymerizable element of Claim 4 wherein the amount of the onium salt is at least twice the amount of the cyclic lactone dye.

13. The photopolymerizable element of Claim 1 wherein the amount of the leuco dye is 0.1 to 0.3 % by weight, based on the total weight of the components in the photopolymerizable layer.

14. The photopolymerizable element of Claim 1 further comprising an actinic radiation opaque layer disposed above a surface of the photopolymerizable layer opposite the support.

15. The photopolymerizable element of Claim 1 further comprising a release layer disposed above a surface of the photopolymerizable layer opposite the support.

16. The photopolymerizable element of Claim 1 further comprising an elastomeric layer on the surface of the photopolymerizable layer opposite the support, the elastomeric layer comprising an elastomeric binder, a second onium salt and a second leuco dye, wherein both of the second salt and the second leuco dye can be the same or different than the onium salt and leuco dye in the photopolymerizable layer.

17. The photopolymerizable element of Claim 1 wherein the photopolymerizable layer is at least 0.020 inch (0.05 cm) thick.

18. The photopolymerizable element of Claim 1 wherein the binder is elastomeric.

19. The photopolymerizable element of Claim 1 wherein the photoinitiator is sensitive to radiation between 310 and 400 nm, and the photopolymerizable layer further comprises a second photoinitiator sensitive to radiation between 220 and 300 nm.

31. The photopolymerizable element of Claim 1 wherein the photopolymerizable layer has a first color and is imagewise exposed to actinic radiation of at least 1 joules/cm^2 to change the exposed portions of photopolymerizable layer to a second color.

32. The photopolymerizable element of Claim 1 wherein the photoinitiator when exposed to actinic radiation generates free radicals which initiate the polymerization of the at least one monomer.

33. A relief printing plate comprising:

(a) a support;

(b) a photopolymerized elastomeric layer on the support made from a photopolymerizable composition comprising a binder, at least one monomer, a photoinitiator, an onium salt, and a leuco dye;

wherein the photopolymerizable layer has a relief surface with raised areas and a floor that contrasts in color with the raised areas.

40. The element of Claim 1 wherein the photopolymerizable elastomeric layer has a thickness of at least 0.050 cm and the binder is an elastomeric binder, whereby the onium salt and the leuco dye together are capable of providing a contrasting color image upon imagewise exposure to actinic radiation of at least 1.0 Joules/cm^2.